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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,627	02/06/2002	Hitoshi Kato	33082M119	4442

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EXAMINER

GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 09/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/066,627

Applicant(s)

KATO ET AL.

Examiner

Maria Guerrero

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 1-6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 13 June 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. This Office Action is in response to the Amendment filed June 13, 2003.

Claims 1-12 are pending.

Election/Restrictions

2. Applicant's election of Species II (claims 7-12) in Paper No. 4 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 1-6 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 4.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

4. The objection to the title has been withdrawn.

Drawings

5. The drawings were received on June 13, 2003. These drawings are approved.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 7-8 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over R.C. Taylor et al. "LPCVD of Silicon Nitride Films From Hexachlorodisilane and Ammonia" in view of Mizuno et al. (U.S. 6,486,083) and Applicant admitted prior art.

7. Taylor et al. shows supplying hexachlorodisilane and ammonia to a reaction vessel to form a silicon nitride film on a work piece. Taylor et al. teaches employing an inert gas (N₂) during the process, producing a Si-N-H compound, and heating the reactor chamber at a temperature in the range of 450 to 850°C. (pages 319-323).

Regarding claims 7-8 and 11-12, Taylor et al. does not specifically show discharging ammonia from the reaction vessel into the exhaust pipe to pre-clean the inside of the exhaust pipe. However, Mizuno et al. teaches that the exhaust pipe is necessarily present on Taylor et al. process (col. 5, lines 15-43). Mizuno et al. discloses discharging ammonia from the reaction vessel into the exhaust pipe before and after deposition (pre-cleaning) (col. 5, lines 55-67). Mizuno et al. also shows supplying an inert gas (N₂) after and before supplying the ammonia (col. 5, lines 55-67, col. 6, lines 1-15).

Taylor et al. does not expressly show the Si-Cl-N-H compound remaining in the exhaust pipe. However, this could be inferred from Taylor et al. process. In addition,

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Applicant admitted prior art teaches, as well known in the art, when hexachlorodisilane and ammonia react produced the Si-Cl-N-H compound as an intermediate product (page 2). Applicant admitted prior art also shows that the exhaust pipe is necessarily present on Taylor et al. process (page 1, Fig. 6).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Taylor et al. reference by including the step of discharging ammonia from the reaction vessel into the exhaust pipe as taught Mizuno et al. and recognize that the Si-Cl-N-H compound is formed in Taylor et al. process as taught Applicant admitted prior art. The modification is proper because Taylor et al. disclosed increasing the ammonia flow rate (Taylor et al., Fig. 2). The modification would provide a silicon nitride film having better uniformity and a process having less contamination on the final product, which is one of the objectives of Taylor et al. (Mizuno et al. col. 2, lines 28-29; Taylor et al., Fig. 2, Abstract).

8. Claim 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over R.C. Taylor et al. Mizuno et al., and Applicant admitted prior art (U.S. 6,486,083) as applied to claims 7-8 and 11-12 above, and further in view of Saito et al. (U.S. 6,159,298).

Regarding claims 9-10, the combination of R.C. Taylor et al. and Mizuno et al. (U.S. 6,486,083) does not specifically show heating the exhaust pipe at 100° C. or above and set the pressure in the range of 665 to 66500 Pa. However, Saito et al. teaches heating the exhaust pipe at 150° C. and employing a pressure of 5 torr (665 Pa) (col. 5, lines 60-65, col. 8, 1-3).

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Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of R.C. Taylor et al., Mizuno et al., and Applicant admitted prior art by including the step of heating the exhaust pipe as taught Saito et al. in order to avoid adhesion of any by-products.

Response to Arguments

9. Applicant's arguments with respect to claims 7-12 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

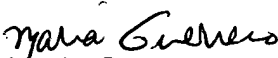
10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lee et al. (U.S. 6,495,476)(of record) teaches providing ammonia gas in the chamber. Yamaga et al. (U.S. 5,484,484)(of record) teaches the exhaust pipe connected to the reaction vessel is conventional in the art. Tanaka et al. (U.S. 6,354,241) is cited as evidence to show that the formation of Si-N-H during deposition of silicon nitride is known in the art (col. 6, lines 60-67).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-49055. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Maria Guerrero
Patent Examiner
August 21, 2003